

Benefits of Cloud and AI in Medical Imaging

Marc Smith

Leader for Cloud and Strategic Infrastructure
Merge Imaging Solutions, Merative



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Executive Summary

In today's rapidly evolving healthcare landscape, the ability to efficiently manage and analyze medical imaging data is crucial for improving patient care, accelerating clinical research, and enhancing collaboration among healthcare professionals and researchers. The legacy imaging applications that are in use today were, for the most part, all designed to provide imaging services in one department of one hospital.

But today, radiologists are reading more and more studies outside of the facility they were acquired in. Coupled with an exponential growth in the number of imaging studies being

generated – driven by an aging population, more complex diseases, and procedures previously deferred by COVID-19 – these legacy solutions are being pulled and stretched beyond their limits, and the pain is being felt acutely by the providers.

To keep up with the demands of today's imaging environments, and to ensure that radiologists are primed to face the future with confidence, imaging solutions must be built with a cloud-first, cloud-native, "any image, anywhere, anytime" mindset – or they will fail to meet physicians' needs and exacerbate burnout.

Introduction

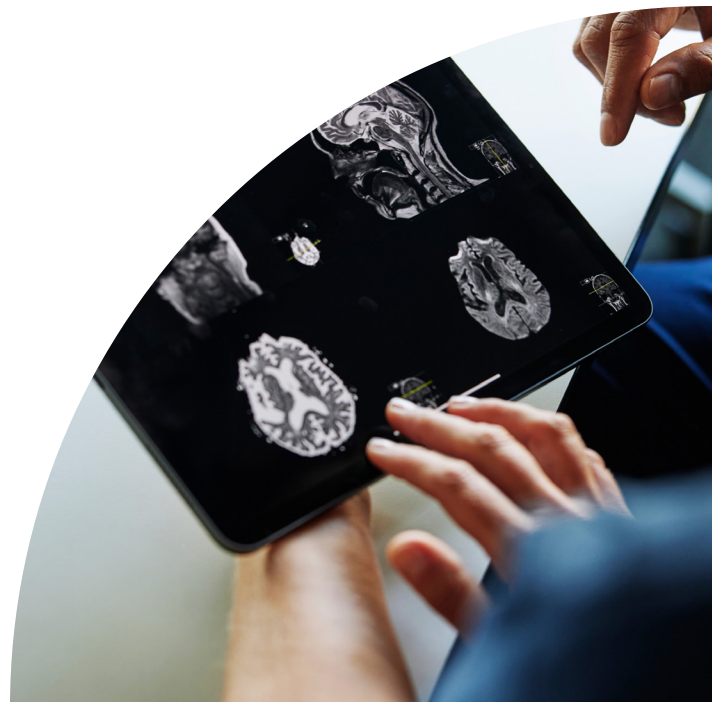
When digital medical imaging first started over 20 years ago, the primary objective was to convince radiologists, hospitals, and imaging organizations to change from reading plain film to digital images. Radiologists had to be shown the value of no longer needing to view one single image at a time on a light box, or needing to take up multiple rooms in a hospital to store those films. By leveraging a computer and the right monitor setup, they had access to more data at their fingertips than ever before. They would never go back to reading on a light box.

While racks of computers and storage had to be installed and networking equipment deployed to create high-speed networks for these images to be sent across, the transition from film to digital helped create new, essential functionalities for medical imaging:

- Improved patient recordkeeping, thanks to archiving images in a rack instead of multiple rooms, providing faster access to studies and priors, and higher quality imaging to provide more accurate diagnoses
- CT, MR, PET/CT Fusion, mammography, 3D mammography/tomosynthesis, and 3D printing of those images to create life-size models that can be used as prep for complex surgeries
- Digital pathology
- Reading studies remotely
- Common worklists that aggregate studies across multiple sites.

We would likely agree that all of these advances have driven better patient outcomes, but not without a cost. Modern imaging environments have created such enormous volumes of imaging data to sort through and read that they are fueling physician burnout at an alarming rate.

Today we are at the next inflection point for medical imaging, as we move into the cloud and integrate artificial intelligence into imaging workflows. Cloud and AI are poised to be the next major breakthroughs in imaging, helping radiologists to prioritize the most urgent patient studies, reduce noise, increase uptime, mitigate burnout with more efficient workflows, and ultimately help improve patient care.





The problem: the high cost of being on-premise

As on-premise solutions have grown beyond their initial use cases and design, they have become expensive to maintain and support. Imaging data volumes for hospitals are doubling roughly every five to seven years; this issue will only become more pronounced with digital pathology. With the estimated cost to own, support, and maintain 1PB of storage on-premise being over \$1.3M over five years the storage problem is only getting worse.

Meanwhile, hospital IT staffs are overburdened with the multiple, disparate legacy systems they must keep running, upgrading, protecting and maintaining. Consequently, application upgrades often don't happen for years because the staff just don't have the bandwidth to take on another upgrade. The endless five-year cycle of hardware refreshes creates constant disruptions to workflows, and as the applications demand more compute and storage resources, the costs of maintaining them continue to climb.

This dual conundrum of overly complex solutions and the need for more external access to imaging systems makes it

a nightmare for local hospitals to ensure the security of these applications. On top of all of this, hospitals are expected to integrate AI into their physician workflows without disruption. As of January 2023, there are 520 medical imaging AI algorithms cleared for use by the FDA -- how are imaging organizations expected to manage integrating and testing these algorithms when they're already barely treading above water as is?

On-premise hardware and software face additional challenges. How much do you actually need? And for how long? Virtualization helped mitigate the issue with compute resources, but storage is still a challenge. Medical imaging, for most hospitals, produces more data than all of the other areas of the hospital combined. Imaging organizations will buy storage in five-year increments, but the ROI is questionable – you either purchase too little upfront and have to add more later on, or you purchase too much and the hardware needs to be refreshed before you use it all. The same applies to software licensing. Either you haven't licensed enough and you have a bill at the end of the year to cover the difference, or you have licensed too much and you have wasted the difference.

The solution: taking a cloud-native approach to imaging

Cloud-based solutions, when implemented correctly, can provide significant benefits over on-premise solutions. However, many imaging organizations are moving their applications to the cloud by the “Lift and Shift” model: simply taking their on-premise solutions and running those same virtual machines (VMs) in the cloud. This isn’t solving the problem; it’s just moving it into different data centers. Imaging organizations that go the lift-and-shift route end up with the same applications that were still designed for just one department in one building.

Taking full advantage of the cloud for medical imaging requires rewriting existing applications or implementing new ones from the ground up that are cloud native and capable of seamlessly integrating AI into their user interfaces. Cloud-native applications are designed and optimized for running in a public cloud, built

on a microservices architecture, deployed using containerization technology, and run in a “software as a service” (SaaS) model. Cloud-native solutions run as a SaaS offering typically provide better overall solutions, offering lower costs, improved security, easier access from remote locations, scalability that dynamically grows or shrinks with your organization, and tighter integration with AI algorithms.

With cloud offering imaging organizations savings as much as 54% over on-premise solutions for enterprises and 31% for small businesses, the value of taking the cloud-based approach to medical imaging far outweighs legacy on-premise solutions. Moving to cloud means you pay for exactly what you use, no more, no less.



Merge Imaging Suite

Merge Imaging Suite is the ideal solution to meet the needs of today’s radiologists and imaging organizations. By taking the standards-based approach of our product portfolio and extending that to a modern, cloud-native infrastructure, Merge has built an AI-infused enterprise platform for customers focused on the clinical workspace.

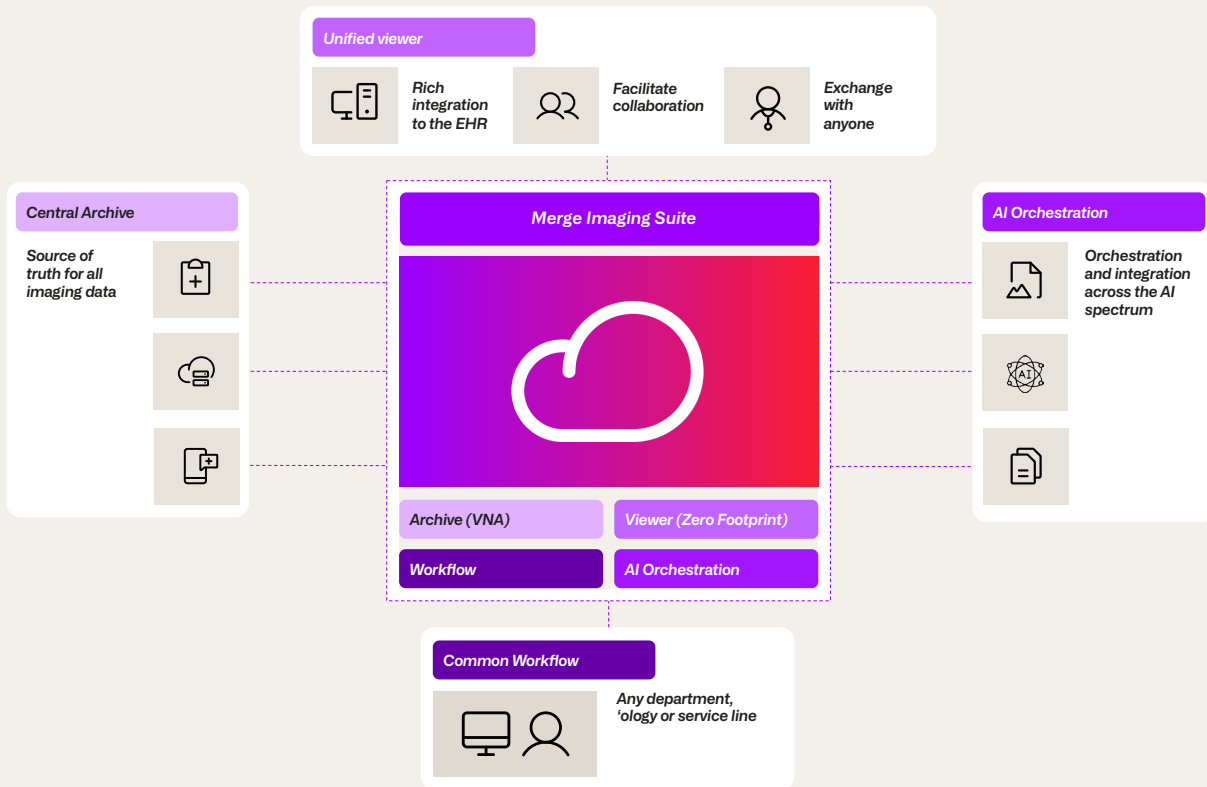
Merge Imaging Suite consists of four primary components:

Merge VNA – A central archive to manage and exchange all data from a single location.

Merge Universal Viewer – A single viewer with a patient-centric approach to display DICOM, XDS, and reports, from across all departments and ologies.

Merge Workflow Orchestrator – Implementing a common workflow with an intuitive user interface, across any department, ology, or service line.

Merge AI Orchestrator – Providing physicians with control over how they access AI insights seamlessly within their reading workflows.



Conclusion

The cloud-native Merge Imaging Suite enables imaging organizations to easily move their enterprise imaging solutions to the cloud as a SaaS offering. This helps to reduce their overall data center footprint, on-premise infrastructure complexity, and software maintenance burdens, while also simplifying AI integration capabilities – setting up radiologists, physicians, and IT teams to face their future with confidence in their systems.

About Merge

Merge medical imaging solutions, offered by Merative, combine intelligent, scalable imaging workflow tools with deep and broad expertise to help healthcare organizations improve their confidence in patient outcomes and optimize care delivery.

Learn more at

merative.com/merge-imaging.

About Merative

Merative is a data, analytics and technology partner for the health industry, including providers, health plans, employers, life sciences companies and governments. With trusted technology and human expertise, Merative works with clients to drive real progress. Merative helps clients orient information and insights around the people they serve to improve decision-making and performance. Merative, formerly IBM Watson Health, became a new standalone company as part of Francisco Partners in 2022.

Learn more at www.merative.com

References

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4. [How Cloud Can Help Reduce IT costs for Small and Medium Businesses](#)



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900 Walnut Ridge Drive, Hartland, WI USA 53029

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